ENCLOSURE 1

EXPANDED SITE INSPECTION REPORT
FOR THE
BENDIX AUTOLITE CORPORATION SITE
(A.K.A. ALLIED SIGNAL)
FOSTORIA, OHIO

(34 Sheets)

-4413-
Wear C.

EXPANDED SITE INSPECTION REPORT
FOR
BENDIX AUTOLITE CORPORATION
1600 NORTH UNION ROAD
FOSTORIA, OHIO

U.S. EPA ID NO.: OHD 066 046 228

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Site Assessment Section
77 West Jackson Boulevard
Chicago, IL 60604

U.S. EPA Work Assignment No.	:	36-5JZZ
U.S. EPA Region	:	5
Date Prepared	:	February 6, 1996
Contract No.	:	68-W8-0084
PRC Project No.	:	030-0036535
Prepared by	:	PRC Environmental Management, Inc. (Gabriel Rood)
PRC Project Manager	:	Gabriel Rood
Telephone No.	:	(513) 241-0149
U.S. EPA Work Assignment Manager	:	Jeanne Griffin
Telephone No.	:	(312) 886-3007

CONTENTS

CONTENTS (Continued)

FIGURES

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC), was tasked by the U.S. Environmental Protection Agency (U.S. EPA) to conduct an expanded site inspection (ESI) of the Bendix Autolite Corporation site under Contract No. 68-W8-0084, Work Assignment No. 36-5JZZ.

The purpose of an ESI is to collect sufficient information about the site to assess the threat posed to human health and the environment and to determine the need for additional investigations and possible remediation under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). PRC prepared this report from information provided by EPA, the Ohio Environmental Protection Agency (OEPA), and the Seneca County Health Department (SCHD).

2.0 SITE DESCRIPTION

The site is an active 54-acre manufacturing facility that produces spark plugs and oxygen sensors for internal combustion engines. The facility is currently owned by AlliedSignal, Inc. (AlliedSignal), and operates under the name of Autolite Division Allied Corporation. The site is listed in EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) as the Bendix Autolite Corporation (Bendix) site, the name of the facility's former owner and operator.

The CERCLIS designation Bendix is used in this report; however, the site is actually a complex groundwater contaminant plume extending across several property boundaries. Since the early 1980s, the Bendix facility and several other local industries have been under OEPA and SCHD investigation regarding chlorinated solvent contamination in area groundwater. The contamination has resulted in the closure of about 68 nearby drinking water wells. Trichloroethene (TCE) concentrations of more than 114,000 micrograms per liter (μg/L) have been reported in some groundwater samples. Other groundwater contaminants detected include perchloroethene (PCE); 1,1,1-trichloroethane; 1,2-dichloroethene; and vinyl chloride. These compounds are generally present in much lower concentrations than TCE.

2.1 SITE LOCATION

The Bendix site is located at 1600 North Union Street in an industrial section of northeast Fostoria, Seneca County, Ohio. The site's geographic coordinates, measured from the center of the facility, are 41°10'39.5" north latitude and 83°25'00.0" west longitude (U.S. Geological Survey [USGS] 1972). Fostoria (population 15,000) is located in a largely rural portion of northwestern Ohio, about 40 miles southeast of Toledo (PRC 1996b).

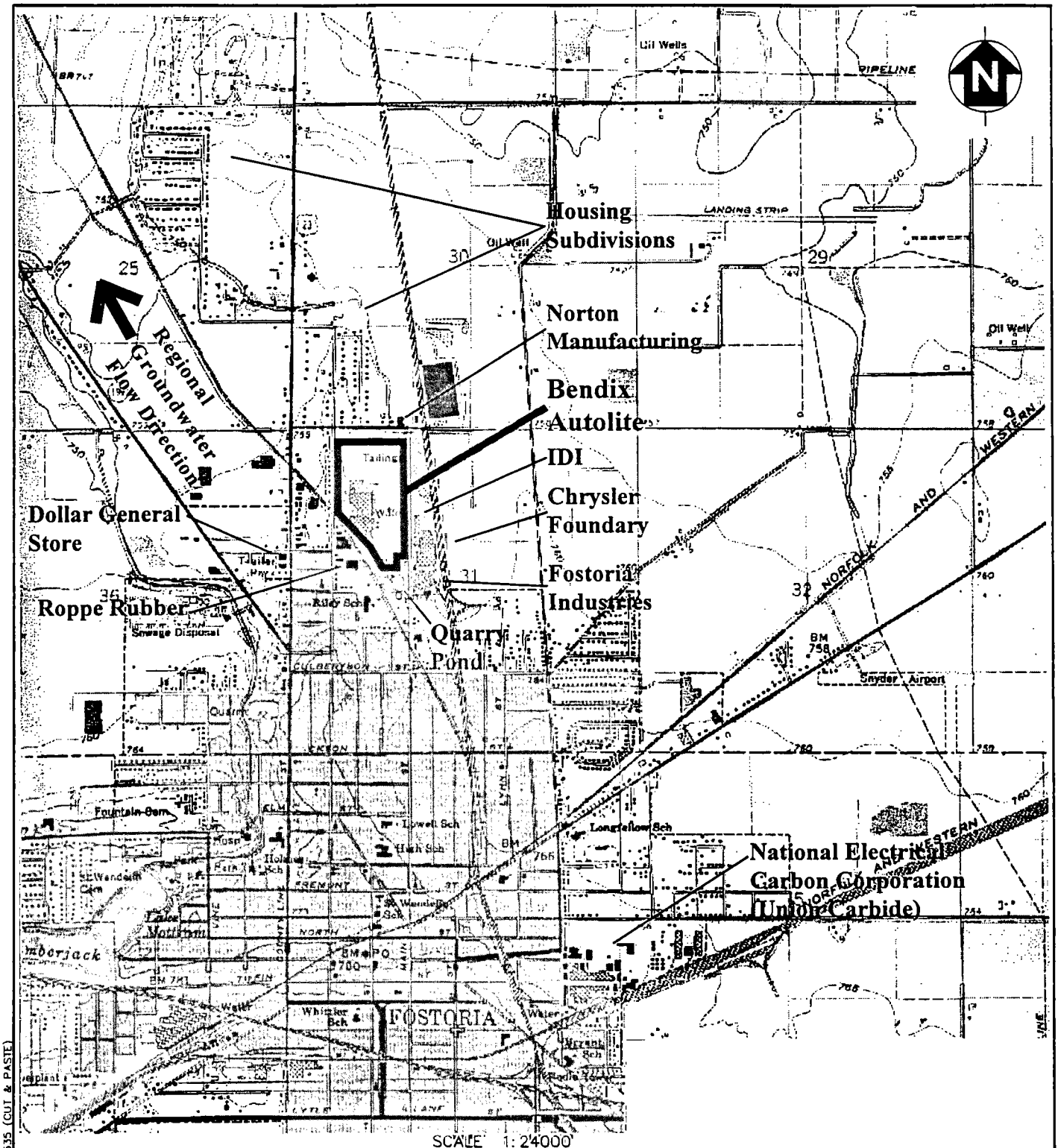
2.2 SITE VICINITY

Figure 1 shows the location of the Bendix site in relation to Fostoria and surrounding features. The areas east, northeast, and southeast of the site are primarily industrial. Nearby industries include Norton Manufacturing; Industrial Dimensions, Inc. (IDI); Fostoria Industries; National Electric Carbon Corporation (NECC); the Roppe Rubber Company (RRC); and a former Chrysler Corporation (Chrysler) foundry.

Residential areas are located to the north, west, and south. The nearest residence is located on North Union Street, about 100 feet west of the site (PRC 1995). Two housing subdivisions are located north and northwest of the site. The nearest school, Riley School, is located 1,000 feet south of the site (PRC 1995; USGS 1972). About 18,195 people live within a 4-mile radius of the site (Frost and Associates 1995).

Drinking water for the City of Fostoria is obtained from six surface water reservoirs located 1.5 to 4 miles southwest of the site. The reservoirs are replenished by the East Fork of the Portage River. Most residents in areas outside the city limits of Fostoria (generally those areas immediately north of the Bendix facility) obtain their drinking water from private wells that are about 80 feet deep (Ohio Department of Natural Resources [ODNR] 1948-1968; PRC 1995). Groundwater is drawn from the Lockport Dolomite, a fractured bedrock aquifer. This aquifer also provides production water for several local industries, including Bendix and RRC (Keck Consulting Services, Inc. [Keck] 1987).

Seneca County is characterized by a temperate continental climate. Summers are warm with average daily temperatures of 72°F. The winter months are generally cold with daily average temperatures of



SCALE 1:24000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

SCALE 1"=2,000'

OHIO

QUADRANGLE LOCATION

SOURCE: MODIFIED FROM USGS FOSTORIA QUAD., 1972

BENDIX1.DWG - 12/29/95 - RVR - 030-0036535 (CUT & PASTE)

BENDIX AUTOLITE CORP. (Allied Signal)
FOSTORIA, OHIO

FIGURE 1

SITE LOCATION

PRC ENVIRONMENTAL MANAGEMENT, INC.

29°F. Total annual precipitation for the area is 33 inches (U.S. Department of Agriculture [USDA] 1980). The 2-year, 24-hour rainfall for the area is 2.39 inches (Huff and Angel 1992).

2.3 SITE FEATURES

Figures 2 and 3 show the principal features of the Bendix facility. The facility is bordered to the west by North Union Street, to the north by Jones Road, and to the east by North Main Street. The Chesapeake and Ohio (C&O) Railroad, and an abandoned rock quarry and oil transfer station (Pearl Oil) form the southern boundary of the site.

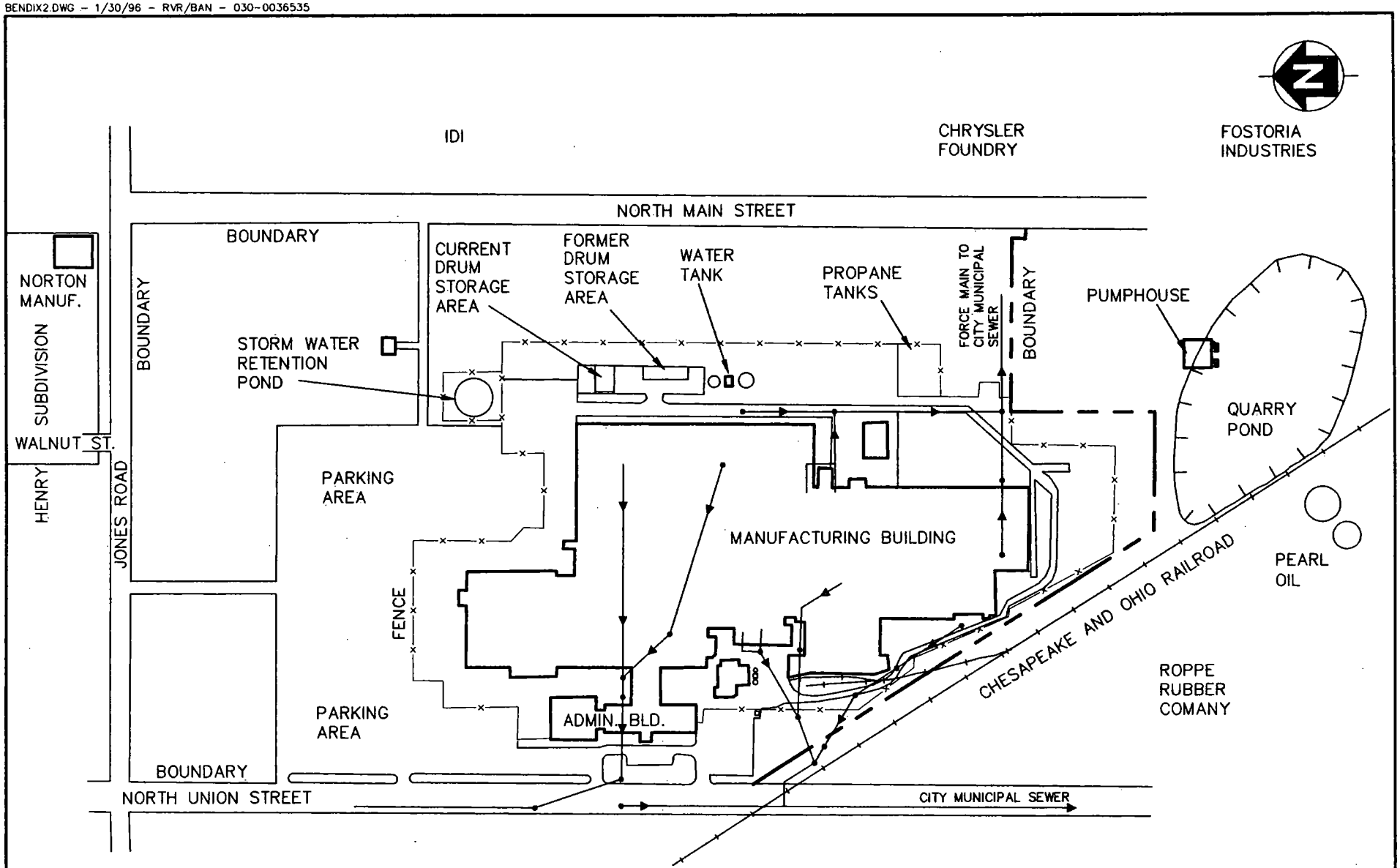
PRC performed a reconnaissance inspection of the Bendix facility on December 7, 1995, and found conditions generally consistent with those noted during previous investigations. Information presented below is based on PRC's observations during the reconnaissance inspection, unless otherwise specified. Photographs taken during the inspection are presented in Appendix A.

About 20 percent (480,000 square feet) of the site property is covered with buildings and other structures. The remaining portions of the site consist of paved parking lots and flat grassy areas. A chain-link fence encloses the manufacturing portion of the facility (see Photograph No. 1). Visitors obtain access to the site through a parking lot on North Union Street. Access to the manufacturing area is controlled by gates that are manned by private security guards (PRC 1995).

The manufacturing area consists of original site buildings to which several modern additions have been added (see Photograph Nos. 2 and 3). The administrative offices and the product engineering research and development department are located in the westernmost building, along North Union Street. The remainder of the area consists of large open buildings that house spark plug and oxygen sensor manufacturing and warehouse operations. The current storage building for hazardous waste drums (see Photograph No. 4) is located on the east side of the facility adjacent to the shipping and receiving dock. An older storage building for hazardous waste drums is located about 100 feet south of the current one (see Figure 2).

During a perimeter tour of the of the site, PRC documented the locations of neighboring industries and other features near the border of the site (see Photograph Nos. 5-10). A storm water retention

BENDIX2.DWG - 1/30/96 - RVR/BAN - 030-0036535



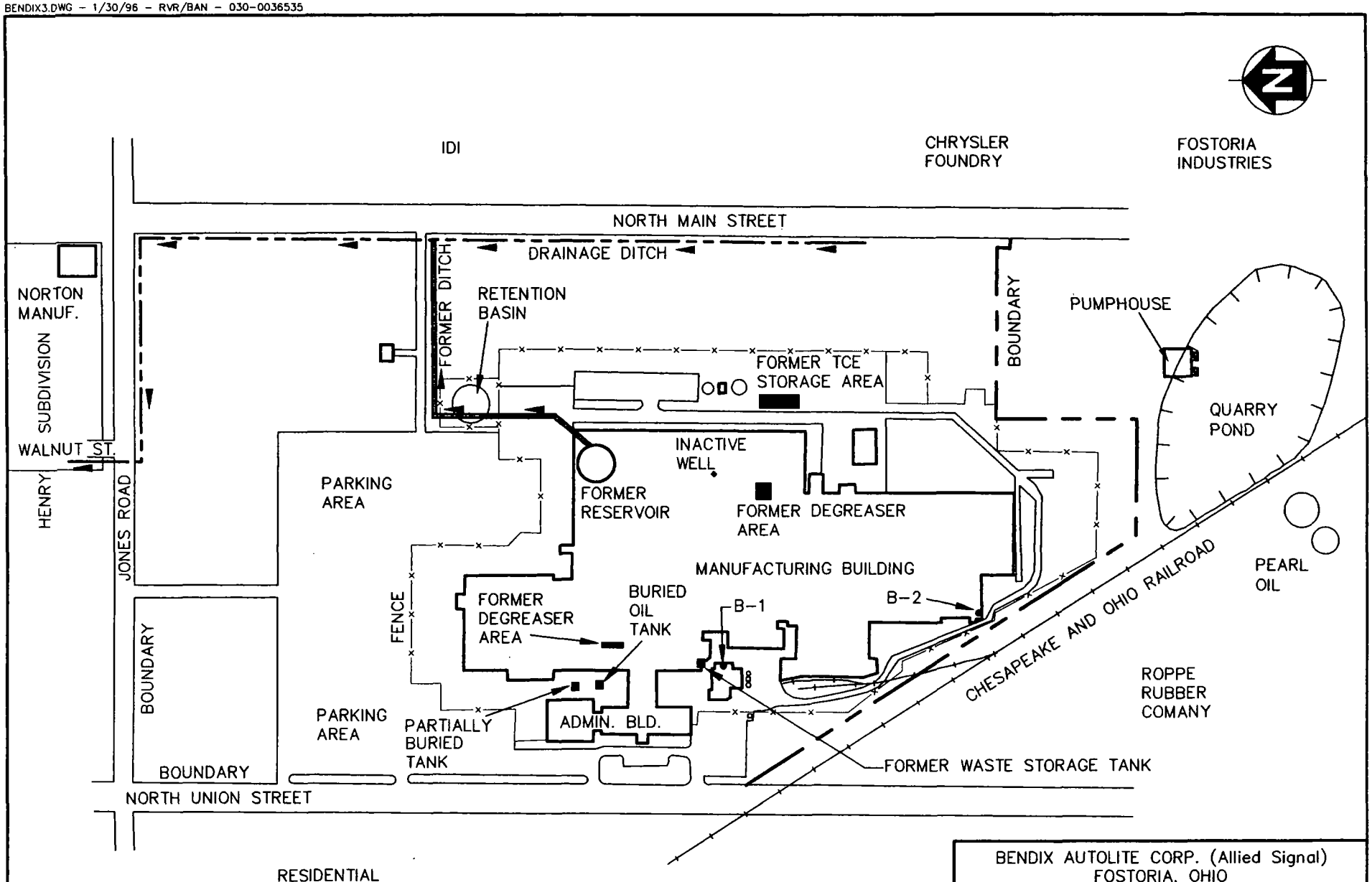
SOURCE: MODIFIED FROM ALLIED SIGNAL 1995

BENDIX AUTOLITE CORP. (Allied Signal)
FOSTORIA, OHIO

FIGURE 2
SITE FEATURES

PRC ENVIRONMENTAL MANAGEMENT, INC.

BENDIX3.DWG - 1/30/96 - RVR/BAN - 030-0036535



SOURCE: MODIFIED FROM ALLIED SIGNAL 1995

BENDIX AUTOLITE CORP. (Allied Signal)
FOSTORIA, OHIO

FIGURE 3

SITE FEATURES AND SUSPECTED SOURCES OF TCE

PRC ENVIRONMENTAL MANAGEMENT, INC.

pond is located at the northeast corner of the site (see Photograph No. 11). A large drain pipe is located in the northeast corner of the pond. Water released to the drain pipe flows through a buried drain pipe to an unnamed intermittent drainage ditch located east of the site (see Figure 3). A rail siding and railroad tracks serve the southwest side of the site and nearby industries (see Photograph No. 12).

Several potential sources of chlorinated solvents were formerly located at the rear or east side of the site (see Photograph No. 13 and Figure 3). A hazardous waste drum storage area, a TCE storage tank, and an indoor TCE degreaser unit were located in this area. Another former degreaser unit, two buried tanks, and a waste storage tank were located on the western side of the manufacturing facility (see Figure 3).

The facility maintains two on-site wells (B-1 and B-2 in Figure 3). One well is used for noncontact cooling water. The other is an extraction well that pumps continuously to contain the TCE groundwater contaminant plume under the facility.

Wastewater is discharged through three underground sewer outfalls to the City of Fostoria sanitary sewer system (see Figure 2). The outfalls manage noncontact cooling water, parts washing water, floor scrubbing wash water, and cooling water from two wells on site. TCE contaminated groundwater pumped by the extraction well is also discharged to the City of Fostoria sewers (see Section 2.6.7).

2.4 SITE OPERATIONS AND HISTORY

Although the site has had many different owners, the Bendix site and buildings have been used for manufacturing for almost 100 years. The Peabody Buggyworks manufactured horse-drawn buggies at the site from the late 1800s until 1936. Since 1936, spark plugs have been manufactured at the site. From 1936 to 1961, the site was owned and operated by Electric Autolite. Ford Motor Company (Ford) purchased the business in 1961, and continued operating the facility until 1973, when it was purchased by Bendix. AlliedSignal purchased the site in 1983 (Ecology and Environment, Inc. [E&E] 1991; PRC 1995).

The facility manufactures several types of spark plugs and oxygen sensors for internal combustion engines, including those for automotive and truck engines. Raw ceramic powders and steel bar stock are used in the manufacture of the spark plugs. Ceramic powder is formed, fired, and glazed. Steel bar stock is machined, coated, and washed. Ceramic and metal parts are then assembled into the final product. Previous operations included the manufacture of the metal shells for the spark plugs, but these are currently manufactured at other facilities and shipped to the site for assembly. Oxygen sensors have been manufactured at the facility since 1978 (E&E 1991; PRC 1995).

2.5 HISTORIC WASTE STREAMS AND SOURCES OF TCE

Limited information is available about waste handling prior to 1980. According to SCHD, the facility used large quantities of TCE in the 1970s. The TCE was stored in large containers around the site. In addition, a small gravel-filled sump near the administration building was used to dispose of TCE. This sump also allegedly received TCE from floor drains (OEPA 1984).

In 1972, the Ohio Department of Health (ODH) received a permit application from Ford to conduct spark plug degreasing operations at the facility. The permit was submitted in response to new regulations covering the use of TCE in degreasing operations. The degreasing operation was previously unregulated at the site. The permit states that about 430 pounds of TCE was used every hour in the facility's degreasing process (ODH 1972).

On August 13, 1980, Bendix submitted to EPA a Notification of Hazardous Waste Activity (EPA Form 3010) stating that the facility generated 1) waste halogenated solvents from degreasing operations, and 2) waste cyanide solutions from heat-treating of metals. An estimated 21,000 pounds of spent halogenated solvents and 4,200 pounds of spent cyanide solutions were listed as generated each year. According to Bendix, all wastes were stored in drums, and were shipped off site for disposal (Bendix 1980; E&E 1991). According to EPA (1982), the Bendix facility is considered a small quantity generator under the Resource Conservation and Recovery Act (RCRA).

In 1985, OEPA conducted a survey of historic solvent usage and operating practices of local Fostoria industries. Bendix's response to the survey indicated that the facility generated about 1,650 gallons per year of 1,1,1-trichloroethane, 8,600 gallons per year of waste sodium hydroxide, 50 gallons per

year of 2-butanone, and previously had generated about 55 gallons of waste cyanide per year. In 1985, the facility was using 1,1,1-trichloroethane, mineral spirits, TCE, 2-butanone, benzene, and dioctyl-phthalate (E&E 1991).

A 1985 investigation conducted by Bendix's environmental consultant T.A. Gleason and Associates (TAGA) identified several suspected or known sources at the Bendix site that may have released volatile organic compounds (VOC) over a 30-year period. TAGA identified several possible on-site sources of TCE contamination: two former TCE degreasers and distillation units, underfloor chip conveyors, a former TCE storage area, a former waste storage tank, and several underground storage tanks. The study also noted that the storm water retention pond and several drainage ditches around the facility possibly received waste TCE. The units associated with the solvents and wastes have subsequently been removed; PRC was unable to determine the sizes or physical condition of these potential sources. Residual spills, leaks, or discharges from these units could still be present in soils and fill beneath the manufacturing areas or pavement (TAGA 1986).

2.6 OTHER POTENTIAL SOURCES

In addition to the Bendix facility, OEPA has investigated at least seven other potential sources of TCE and other halogenated solvents in the area (OEPA 1995):

- The NECC (formerly known as Union Carbide) site, located about 1.5 miles southeast of Bendix
- the quarry pond, located southeast of the Bendix facility
- Norton Manufacturing
- The former Chrysler foundry
- Fostoria Industries
- Dollar General Store (formerly a drycleaning establishment)
- City of Fostoria sanitary sewers

2.6.1 National Electrical Carbon Corporation (NECC)

NECC manufactures electric motor brushes and various carbon and graphite products. The company has been in operation since the mid-1950s (OEPA 1994). In February 1985, an estimated 600 gallons of TCE were spilled at the NECC facility during the filling of an 8,000-gallon underground storage tank (UST). Preliminary sampling also suggested that one or more previous releases had occurred at the site. In 1988, 1,2-dichloroethane (DCA) was detected in shallow groundwater at the facility. During closure of a former hazardous waste storage area, TCE contamination was discovered in soils and groundwater. The facility has installed a shallow groundwater containment and treatment system (OEPA 1994; PRC 1992).

2.6.2 Quarry Pond

The quarry pond is located about 500 feet southeast of the Bendix manufacturing facilities. When Ford owned the Bendix facility, cooling water was allegedly discharged to the quarry pond. The former Chrysler foundry also used the quarry pond water for extraction and discharge of cooling water. A concrete block building with several discharge pipes is present on the northeast side of the quarry pond. It is unknown whether the pond regularly received hazardous substances, pollutants, or contaminants. TAGA sampled the pond in 1985 and found low concentrations of TCE in the surface water; however, no TCE was found in sediment samples collected from the bottom of the quarry pond (TAGA 1986). The quarry pond is not owned by Bendix (PRC 1995), and its current owner is unknown.

2.6.3 Norton Manufacturing

Norton Manufacturing (Norton) is located at 110 West Jones Road, about 1,000 feet north of the Bendix site. Norton manufactures crankshafts for automotive engines (OEPA 1992). The crankshafts are manufactured from forged steel that is machined to specifications and shipped as a finished product. The machining process generates several wastestreams, including water-soluble cooling oils, solvents from two parts washers, and shotblast and dust from a dust collector (OEPA 1992; Norton 1985). The quantity of hazardous wastes generated from these operations is unknown. The company claims not to have used TCE or PCE in its operations (OEPA 1995).

2.6.4 Former Chrysler Foundry

The former Chrysler foundry is located about 400 feet east of the Bendix site. Chrysler operated the foundry at the site from January 1973 to March 1980. Chrysler sold the facility on November 30, 1981. A truck repair business currently operates on the property (PRC 1995).

The Chrysler foundry manufactured automotive castings. Raw materials consisted of iron, green sand moldings, Isocure, oil sand, and raw materials for shell cores. PRC found no information that the facility generated hazardous wastes. However, the foundry did use isopropanol as a carrier agent when painting shell cores. The isopropanol was stored indoors in 55-gallon drums. All isopropanol was used for painting, and no waste was generated. Chrysler claims to have used no TCE, and knew of no solvent spills that ever occurred at the site (Chrysler 1985).

Chrysler also owned the property where IDI is currently located. IDI manufactures coated particle board and has only been in operation since about 1990 (PRC 1996a).

2.6.5 Fostoria Industries

Fostoria Industries is located about 1,000 feet southeast of the site. Fostoria Industries manufactures industrial process heating equipment, lighting fixtures, infrared comfort heaters, and air heating equipment. These products are fabricated, painted, and assembled at the facility. The 1985 waste generation survey conducted by OEPA determined that Fostoria Industries generated spent TCE, toluene, methyl ethyl ketone (MEK) or 2-butanone solvents, and waste enamel acrylic paints. About 960 gallons of hazardous wastes were generated each year.

MEK was used at the site for than 10 years. An estimated 1,100 gallons of MEK was used in 1984 for spray painting operations. Toluene was used at the site for more than 25 years in spray painting operations. An estimated 1,595 gallons of toluene was used in 1984. An estimated 6,000 gallons of TCE was purchased and used by the facility in 1984 for degreasing operations. Clean TCE was stored in an overhead tank and dispersed to a degreasing tank for use. TCE was used at the site for more than 26 years (at the time of the survey) (Fostoria Industries 1985). Historic waste management practices are unknown, and it is unknown if TCE is still used by the facility.

2.6.6 Dollar General Store

Dollar General Store is located about 1,000 feet southwest of the site. During the TAGA investigation, PCE was discovered in the store's well at a concentration of 162 μg/L. PCE is a common dry cleaning solvent (TAGA 1986), and the building formerly housed a drycleaning operation. Waste management practices and the period of operation are unknown.

2.6.7 City of Fostoria Sanitary Sewers

The City of Fostoria sanitary sewers run along North Union and North Main Streets east and west of the Bendix facility. Currently, Bendix discharges all the contaminated groundwater from the pumping wells and process water to the sanitary sewers. The City of Fostoria allows Bendix to discharge wastewater containing total toxic organic concentrations of up to 2.15 milligrams per liter (mg/L) (AlliedSignal 1984). Historically, Bendix and other industries that used TCE may have discharged wastewater contaminated with TCE to the sanitary sewers. One theory proposed by local industry is that the aging sewers may have developed leaks, allowing contaminated wastewater to leak into the aquifer.

3.0 PREVIOUS INVESTIGATIONS

A variety of private and public investigations have been performed at the site since 1984. In May 1984, Chester Engineers, Inc., of Corapolis, Pennsylvania prepared a baseline monitoring report to determine the Bendix site's compliance with regulations governing electroplating and metal finishing point sources. Samples collected from the facility's outfalls to the city sewers revealed the presence of TCE (Chester Engineers, Inc. 1984).

On May 24, 1984, Bendix informed OEPA that TCE had been detected in two on-site water supply wells at 12,000 μg/L in one well and 400 μg/L in the other well. Some time later, Bendix and the SCHD resampled the wells and the storm water retention basin, the quarry pond, and five nearby residential wells. The samples were analyzed for VOCs and metals. TCE was detected in both wells at 20,529 and 800 μg/L. 1,1,1-trichloroethane (378 μg/L) and 1,2-trans-dichloroethene (23 μg/L)

were also detected. TCE was also detected at a concentration of 2.5 μg/L in a private residential well about 1/8 mile north of the site (E&E 1991).

On October 26, 1984, OEPA sent a letter to the SCHD notifying them that TCE had been found in Bendix production wells B-1 and B-2 and in a surface water sample from the quarry pond. Samples collected from B-1 contained concentrations of TCE ranging from 11,000 to 20,000 μg/L. TCE concentrations in samples collected from B-2 ranged from 355 to 800 μg/L (TAGA 1986).

Also in October 1984, Bendix hired TAGA to conduct a comprehensive groundwater study at the site. The investigation included installation of test borings and monitoring wells, and sampling subsurface soils. In addition, the investigation included extensive sampling of 78 residential wells. The highest concentrations were recorded in the two on-site Bendix wells and in off-site industrial supply wells located southeast and southwest of the site. Eighteen of 78 residential wells contained VOCs in concentrations ranging from 1 to 52 μg/L (TAGA 1986). Section 4.1.2 discusses the results of the TAGA investigation.

On November 27, 1984, Bendix submitted to EPA a CERCLA 103c Notification (Form 8900-1). The notification was filed because of the contaminated groundwater plume discovered while sampling groundwater at the site (E&E 1991). On December 3, 1984, the SCHD advised about 100 residents living in the Henry Subdivision to use bottled water for drinking. As a result of the contamination, Bendix immediately supplied 68 residences with bottled water (TAGA 1986). In April 1985, OEPA sent Bendix a letter requesting voluntary participation in a remedial investigation and feasibility study (RI/FS) of the North Fostoria area (E&E 1991).

On September 1, 1994, OEPA sampled the Bendix wells and four production wells at RRC for VOCs. To contain the TCE groundwater plume, one Bendix well (containment well) pumps continuously and discharges the water to the city sewers. The production well supplies noncontact cooling water to Bendix, and the water is also discharged to city sewers. The four RRC production wells supply noncontact cooling water to RRC, and the effluent is discharged to city sewers. Section 4.1.2 discusses the OEPA sampling results.

In October 1986, RRC hired Keck of Williamstown, Michigan to perform a hydrogeologic investigation. The hydrogeologic investigation involved defining the subsurface geology, determining the groundwater quality of the three RRC supply wells, and conducting a soil gas survey of the site for potential source areas of VOCs. The RRC facility uses three groundwater wells to cool manufacturing machinery (Keck 1987). Soil gas samples collected from three locations contained significant concentrations of TCE (80 μg/L or less). Two of the areas were considered hydraulically upgradient of the Bendix facility. As a result of the soil gas survey, three monitoring wells were installed at the facility. Each well was installed to a depth of 200 feet below ground surface (bgs). The monitoring wells were sampled, and a slug test was performed (Keck 1987). Section 4.1.1 and 4.1.2 discuss the results of the investigation. RCC claims to have never used TCE in its operations (OEPA 1995).

In August 1990, Ecology and Environment (E&E) conducted a screening site inspection (SSI) of the Bendix facility under the EPA Field Investigation Team (FIT) contract. FIT collected five on-site soil samples and collected groundwater samples from the five on-site monitoring wells installed by TAGA. Although numerous chlorinated solvents were detected in the monitoring well samples, the soil samples contained no VOCs (E&E 1991).

4.0 MIGRATION AND EXPOSURE PATHWAYS

This section describes the migration and exposure pathways associated with the Bendix site. Section 4.1 discusses the groundwater migration pathway; Section 4.2 discusses the surface water migration pathway; Section 4.3 discusses the soil exposure pathway; and Section 4.4 discusses the air migration pathway.

4.1 GROUNDWATER MIGRATION PATHWAY

This section discusses geology and soils, groundwater releases, and targets associated with the groundwater pathway at the site.

4.1.1 Geology and Soils

Seneca County is located in the Central Lowlands physiographic province, which includes most of the glaciated parts of Ohio. In Seneca County, a mantle of glacial till ranging from a few feet to a hundred feet in thickness overlies Silurian-age carbonate bedrock (USDA 1980). However, the till is only about 10 feet thick in the vicinity of the Bendix site (TAGA 1986).

Two types of soils are present at the Bendix site. The Milton Silt Loam, which covers most of the site, is a well-drained soil found on broad, bedrock-controlled uplands. A smaller portion of the site is covered with the Hoytville Silty Clay Loam. The Hoytville soil type is a deep, poorly drained soil occurring in broad lowlands where it receives runoff from higher-lying soils (the Milton Silt Loam). The Hoytville is subject to seasonal ponding; it is found on the east and northeast portions of the site in a narrow band trending almost north-south (USDA 1980).

Fostoria is located on the east flank of the Findlay Arch. The Findlay Arch is a geologic structure that splays to the northeast off of the Cincinnati Arch (a north-south trending structure) in northwestern Ohio. Fractures associated with this structure are the primary control on the yield of wells drilled into bedrock aquifers in northwest Ohio (USGS 1971).

The Silurian-age Lockport Dolomite is the bedrock aquifer located beneath Fostoria. The Lockport Dolomite possesses high permeability and is an excellent source of water for nearby residents and industry (ODNR 1962). Most of the water flow in the aquifer is through solution channels and horizontal fractures. Solution cavities or large fractures of 1 to 2 feet in height have been noted during drilling (Keck 1987).

Hydrogeologic investigations indicate that the aquifer is unconfined down to a depth of at least 200 feet bgs. The water table is well defined and occurs at a depth of about 19 feet bgs. No shale or other confining layers that would restrict vertical migration of water or contaminants have been noted (Keck 1987). The Lockport Dolomite is at least 300 feet thick in the vicinity of the Bendix site (TAGA 1986; Keck 1987).

Groundwater flow direction is generally to the northwest, although hydrogeologic investigations in the area have determined that production wells at the RRC and Bendix facilities cause mutual interference, and the cones of depression for each well are found to overlap each other. The overlapping cones of influence create dynamic groundwater divides and complex flow paths for groundwater contaminants (Keck 1987).

4.1.2 Groundwater Releases

Most information on groundwater releases in the Fostoria area is provided by the TAGA investigations in the mid-1980s. The TAGA investigations included installation of test borings and monitoring wells, and sampling subsurface soils and residential wells. Seventy-eight residential wells were sampled. Based on a November 1984 sampling of residential wells, TAGA sampled an additional 31 residential and 8 industrial wells within a 5,000-foot radius of the Bendix facility (TAGA 1986). Groundwater contaminated with chlorinated solvents has been detected as far as 3,000 feet north of the facility (OEPA 1995).

4.1.2.1 Releases to Production Wells

The highest VOC concentrations were recorded in water samples from the two on-site Bendix wells, the Fostoria Industries well, and the RRC wells. The Bendix water supply wells B-1, B-2, and B-3 were each sampled and found to contain TCE concentrations ranging from 800 to 21,000 μg/L. Well B-3 was installed to replace B-1 as a supply well. Water from the Fostoria Industries well contained a total VOC concentration of 20,500 μg/L; water from the RRC wells contained VOC concentrations up to 850 μg/L. Monitoring wells at Bendix had TCE concentrations ranging from 250 to 21,428 μg/L (TAGA 1986).

In January 1985, TAGA sampled the Dollar General Store well. The Dollar General Store well contained PCE at a concentration of 162 μg/L. PCE is a solvent historically used in the dry cleaning industry (TAGA 1986).

On September 1, 1994, OEPA sampled the on-site Bendix wells and four production wells at RRC for VOCs. The laboratory detected TCE at a concentration of 0.68 mg/L in the Bendix production well,

and benzene at a concentration of 4.7 mg/L and TCE at 5.6 mg/L in the Bendix containment well. TCE and vinyl chloride were detected in the RRC wells. TCE was detected in three of the four RRC wells at concentrations ranging from 0.011 to 0.036 mg/L. Vinyl chloride was found in one of the four RRC wells at a concentration of 0.041 mg/L. The production well with the highest concentration of TCE and vinyl chloride is located at the northern end of RRC (nearest Bendix) (OEPA 1994).

In March and July of 1985, samples from one monitoring well at the Bendix site were found to contain TCE concentrations of 20,000 and 114,000 μg/L, respectively. This monitoring well is located just east of the power plant. The same well also contained cis-1,2-dichloroethene (902 μg/L), trans-dichloroethene (580 μg/L), and 1,1,1-trichloroethane (111 μg/L) (TAGA 1986).

Limited information is available about possible contamination in other production wells in the area. Chrysler obtained water from a 200-feet-deep industrial supply well located on site. There were no industrial wastewater outfalls to surface water, and all wastewater was discharged to the city sewers. However, Chrysler did state that noncontact cooling water was extracted from the nearby quarry pond and returned to the quarry pond for recirculation or discharged to the drainage ditch running along the west side of North Main Street (Chrysler 1985). Fostoria Industries abandoned its supply well in 1975. The well was used for drinking, cooling, and for boiler water. About 300 gallons of water was used per day (Fostoria Industries 1985). Norton Manufacturing has one well used to water lawns.

4.1.2.2 Releases to Residential Wells

Eighteen of 78 residential wells sampled by TAGA contained VOCs in concentrations ranging from 1 to 52 μg/L. Six residential wells were initially sampled in November 1984 by TAGA and the SCHD. Total VOC concentrations in four of the wells ranged from 5 to 52 μg/L. VOC concentrations in the other two wells were below analytical detection limits. On January 4, 1985, TAGA sampled eight residential wells and the Chrysler foundry well. From January 10 to 12, 1985, TAGA sampled an additional 63 residential wells. Eleven of the residential wells contained total VOC concentrations ranging from 1 to 26 μg/L (TAGA 1986).

4.1.3 Targets

An estimated 1,128 people use groundwater within a 4-mile radius of the Bendix site (Frost and Associates 1995). The City of Fostoria has three back-up wells located 1.5 to 2 miles southwest (upgradient) of the site. The wells are used during periods of drought when surface water supplies obtained from the Portage River are low. The wells were last used in the summer of 1991. The wells pump groundwater into the reservoirs, where the groundwater is blended with surface water. The City of Fostoria wells are screened about 180 feet bgs in the Lockport Dolomite Aquifer. An estimated 16,000 residents of Fostoria are served by the City of Fostoria water system (PRC 1995).

In 1985, about 100 residents north of the site in the Henry Subdivision (North Union, Bittersweet, and Walnut Streets) were exposed to TCE concentrations above EPA maximum contaminant levels for drinking water. As a result, a group of four of the nearby industries paid to hookup the residents to the City of Fostoria water system. Residential wells north of Stearns Road, State Route 199, U.S. Route 23 north of Stearns Road, and a subdivision 0.75 to 2 miles northeast (downgradient) of the site are considered to be subject to potential contamination from the TCE groundwater plume based on current information.

4.2 SURFACE WATER MIGRATION PATHWAY

This section discusses the migration route, surface water releases, and targets associated with the surface water pathway at the Bendix site.

4.2.1 Migration Route

The Bendix site does not lie on a 100-year flood plain. The nearest surface water bodies are the storm water retention pond and the quarry pond, located at the northeast and southeast corners of the site, respectively (USGS 1972). The storm water retention pond currently handles storm water from the facility's parking lots and roofs. The quarry pond was formerly used by Bendix for discharge of cooling water. Neither water body is likely to be used for fishing or recreation. Both are surrounded by fences and are inaccessible to the public.

The storm water retention pond discharges to an intermittent drainage ditch that runs to the northwest for about 1 mile before becoming a small perennial stream. The perennial stream flows to the north for about 10 miles, where it enters the South Branch of Muddy Creek. The South Branch of Muddy Creek flows to the northeast for another 7 miles to Muddy Creek. Muddy Creek flows about 25 miles northeast before emptying into Lake Erie.

4.2.2 Surface Water Releases

On January 4, 1985, surface water samples were collected from the quarry pond. The samples contained VOC concentrations up to 22 μg/L. Three sediment samples were also collected from the bottom of the quarry pond; however, none of the sediment samples contained VOCs (SCDH 1985).

TAGA collected three surface water samples from the drainage ditch during its investigation of the Bendix facility. One of the three samples contained acetone (7.2 μg/L), trichloroethane (17.4 μg/L), and a trace of toluene (TAGA 1986).

4.2.3 Targets

An estimated 16,000 residents of Fostoria are served by the City of Fostoria water system. Water is obtained from the East Fork of the Portage River and stored in six aboveground reservoirs. The reservoirs are located about 1.5 to 4 miles southeast of the site in the Portage River watershed. The Bendix site straddles a topographic divide between the Portage River and Muddy Creek watersheds. Most surface runoff from the Bendix facility drains to Muddy Creek (USGS 1972). Significant runoff to the Portage River is unlikely (PRC 1995; USGS 1972). Muddy Creek is not used for drinking water (ODNR 1995).

Surface water releases from the Bendix site are unlikely to threaten human food chain organisms or sensitive environments. Fishing for human consumption is unlikely in the nearest perennial stream because of its small size. The nearest recreational fishery is probably at least 13 miles downstream of the site (USGS 1972). No wetlands appear to exist within a 15-mile downstream distance from the site (USGS 1972).

The city sewers are old and brick-lined. Some investigators and Fostoria industries have alleged that the aging sewers may be leaking wastewater contaminated with TCE to the area soils and groundwater. The TAGA report also recommended that these sources be characterized in future investigations (TAGA 1986).

4.3 SOIL EXPOSURE PATHWAY

Previous investigations have not indicated that extensive surficial soil contamination is present at the Bendix facility (TAGA 1986; E&E 1991). Much of the site is paved or covered with buildings. One of five soil samples collected during the SSI contained slightly elevated levels of lead compared to background; however, no chlorinated solvents were detected except for methylene chloride which was also present in the blank and assumed to be attributable to laboratory contamination.

4.4 AIR MIGRATION PATHWAY

There is no documentation that a release of hazardous substances attributable to the Bendix facility has occurred to the air migration pathway. On-site sources of TCE have been removed, and no large areas of contaminated soil are present to release VOCs to air.

5.0 SUMMARY

The TAGA investigation sampled residential and industrial production wells within a 5,000-foot radius of the Bendix site. Fostoria Industries is directly upgradient (southeast) of the Bendix site. Fostoria Industries and Bendix both handled TCE wastestreams, and historic waste management practices for each are not well documented. However, the TAGA investigation identified numerous potential sources at the Bendix site. Potential sources and waste management practices at the Fostoria Industries site still need to be identified. In addition, several other potential sources of regional TCE contamination have been identified and further investigation of these potential sources is needed.

Currently, extraction wells at Bendix and other nearby industries may be aiding in containing the TCE plume. However, no regional well sampling has been conducted near the site since the mid-1980s.

The more recent FIT investigation did not sample residential wells, so the extent of possible contamination of residential wells is unknown at this time.

Three surface water samples were collected from the drainage ditch during TAGA's investigation of the Bendix site. Low concentrations of acetone, trichloroethane, and toluene were detected in the drainage ditch. Low concentrations of TCE were also found in quarry water that was sampled. However, three sediment samples collected from the quarry bottom did not show any concentrations of VOCs.

An estimated 16,000 residents of Fostoria are served by the City of Fostoria water system. Water is obtained from the East Fork of the Portage River and stored in six above-ground reservoirs. The reservoirs are located about 1.5 to 4 miles southeast of the site in the Portage River watershed. The City of Fostoria also has three back-up wells located 1.5 to 2 miles southwest (upgradient) of the site.

No sensitive environments appear to exist within a 15-mile downstream distance from the site. A small fishery may exist about 13 miles downstream of the site (USGS 1972). Muddy Creek is not used for drinking water supplies.

No evidence exists to indicate extensive soil contamination is present on the Bendix facility or neighboring properties. No air releases have been documented.

REFERENCES

AlliedSignal. 1984. Baseline Report for General Pretreatment Discharge. May 18.

Bendix Autolite Corporation (Bendix). 1980. Notification of Hazardous Waste Activity. August 13.

Chester Engineers, Inc. 1984. Baseline Monitoring Report Bendix Autolite. May 8.

Chrysler Corporation. 1985. Response to Ohio Environmental Protection Agency (OEPA). Fostoria Industrial Survey Questionnaire. March 20.

Ecology and Environment. 1991. Screening Site Inspection Report for Bendix Autolite. June 17.

Fostoria Industries. 1985. Revised Response to OEPA. Fostoria Industrial Survey Questionnaire. January 28.

Frost and Associates. 1995. Centracts 1990 Census Data for Fostoria, Ohio and Vicinity. September 19.

Huff, Floyd A., and Angel, James R. 1992. Rainfall Frequency Atlas of the Midwest. Illinois State Water Survey. Champaign, Illinois. Bulletin 71.

Keck Consulting Services, Inc. 1987. Report of Hydrogeologic Investigation of the Roppe Rubber Company. August 6.

Norton Manufacturing. 1985. Response to OEPA. Fostoria Industrial Survey Questionnaire. January 29.

Ohio Department of Health. 1972. Spark Plug Degreasing Application Permit. August 17.

Ohio Department of Natural Resources (ODNR). 1948-1968. Well Logs and Drilling Reports for Seneca County, Ohio. Division of Water.

ODNR. 1962. Ohio Water Plan Inventory, Upper and Lower Portage River Basins.

ODNR. 1995. Drinking Water Wells and Surface Water Intakes For Seneca County, Wood County, Sandusky, and Hancock County.

Ohio Environmental Protection Agency (OEPA). 1984. Record of Telephone Conversation Regarding TCE Source at AlliedSignal. Between Kate Wilson, Staff, and Kenneth Kerik, M.P.H., Seneca County Health Department. November 30.

OEPA. 1992. Letter Regarding a Complaint about Norton Manufacturing. From Brent Kuenzli, Division of Hazardous Waste Management. To Mr. Aurice Hoover, Norton Manufacturing. February 18.

OEPA. 1994. Report on Groundwater Samples Collected from AlliedSignal and the Roppe Rubber Company in Fostoria, Ohio. September 1.

OEPA. 1995. Interoffice Communication Regarding TCE Investigation in Northern Fostoria. From Ralph Baker, Division of Emergency and Remedial Response (DERR). To Christina Baker, DERR Group Leader. January 30.

PRC Environmental Management, Inc. (PRC). 1992. Preliminary Assessment/Visual Site Inspection for National Electric Carbon Corporation. October 16.

PRC. 1995. Site Reconnaissance Visit to Bendix Site. December 7.

PRC. 1996a. Record of Telephone Conversation Regarding Bendix Site Vicinity. Between Tom Schaffner, Geologist, and Jack Glenn, Health and Safety Manager, AlliedSignal. January 25.

PRC. 1996b. Record of Telephone Conversation Regarding Population of Fostoria. Between Tom Schaffner, Geologist, and Diane Lind, Administrative Assistant to Mayor, City of Fostoria. January 29.

Seneca County Department of Public Health. 1985. Water Use Advisory Update. January 17.

T.A. Gleason and Associates, Inc. 1986. Hydrological and Groundwater Quality Investigation For Autolite Division, Allied Corporation. Fostoria, Ohio. February 6.

United States Department of Agriculture. 1980. Soil Conservation Service, Soil Survey of Seneca County, Ohio.

United States Environmental Protection Agency (EPA). 1982. Letter Regarding Treatment, Storage, and Disposal Status of Facility. To Mr. C. F. Stecker, President and General Manager of Bendix Autolite Corporation. From Karl J. Kleptisch, Jr., Chief, Waste Management Branch. November 29.

U.S. Geological Survey (USGS). 1971. Availability of Groundwater From Limestone and Dolomite Aquifers in Northwest Ohio and Its Relation to Geologic Structure. By Stanley E. Norris and Richard E, Fidler.

USGS. 1972. 7.5-Minute Series Topographic Map of Fostoria, Ohio, Quadrangle. Professional Paper 750-B, Pages B229-B235.

APPENDIX A

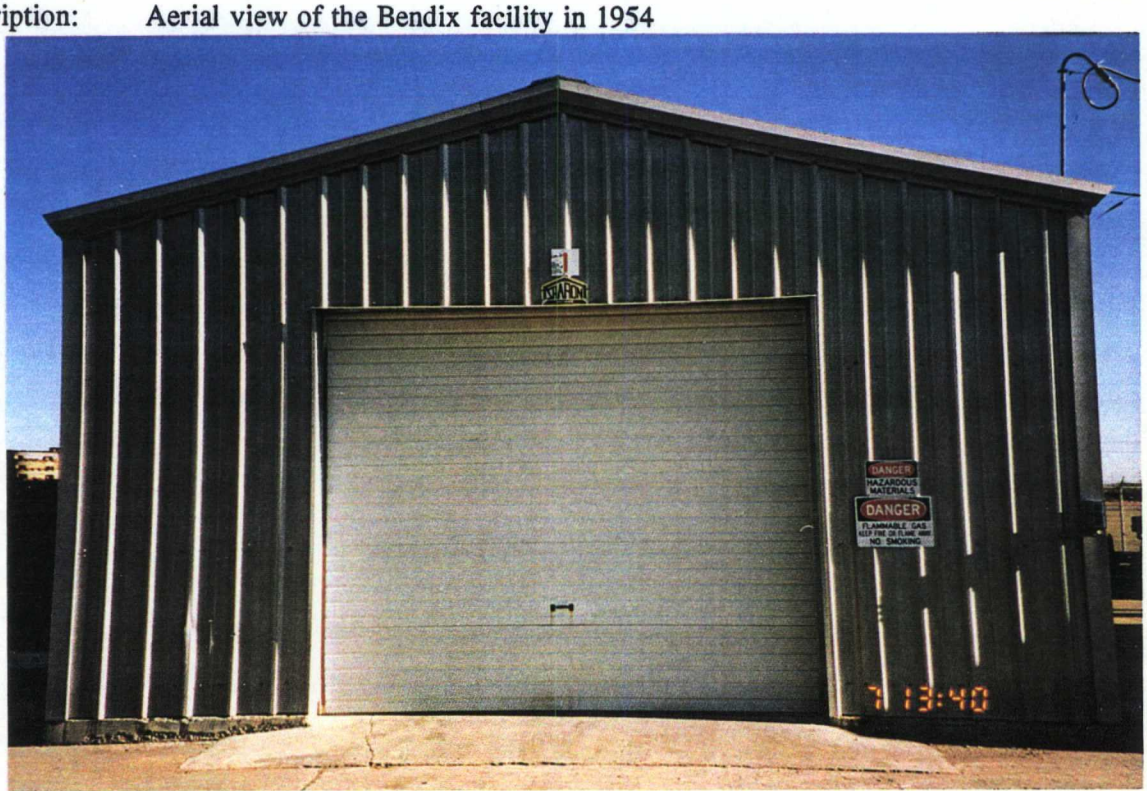
PHOTOGRAPHIC LOG

(Seven Pages)

Photograph No. 1 Location: East side of site
Orientation: Northeast Date: 12/7/95
Description: Fenceline along east side of site; IDI is visible in background

Photograph No. 2 Location: Bendix
Orientation: N/A Date: 12/7/95
Description: Aerial view of the Bendix facility in 1975

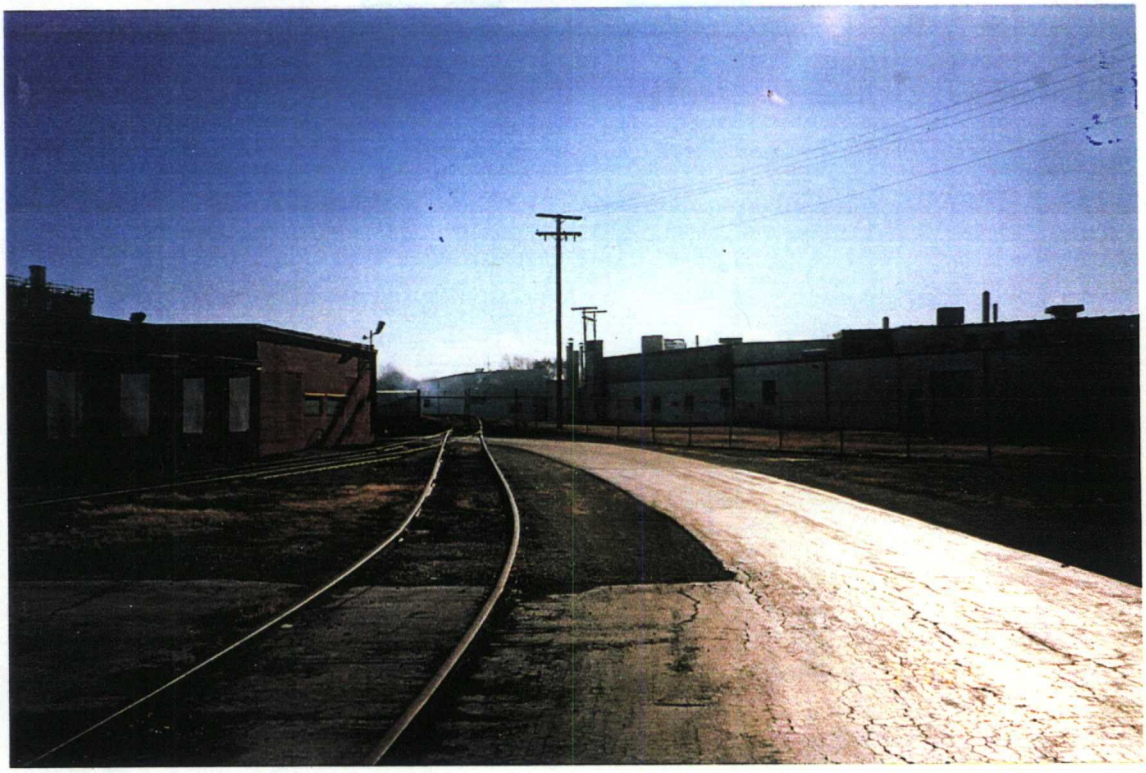
Photograph No. 3 Location: Bendix
Orientation: N/A Date: 12/7/95
Description: Aerial view of the Bendix facility in 1954



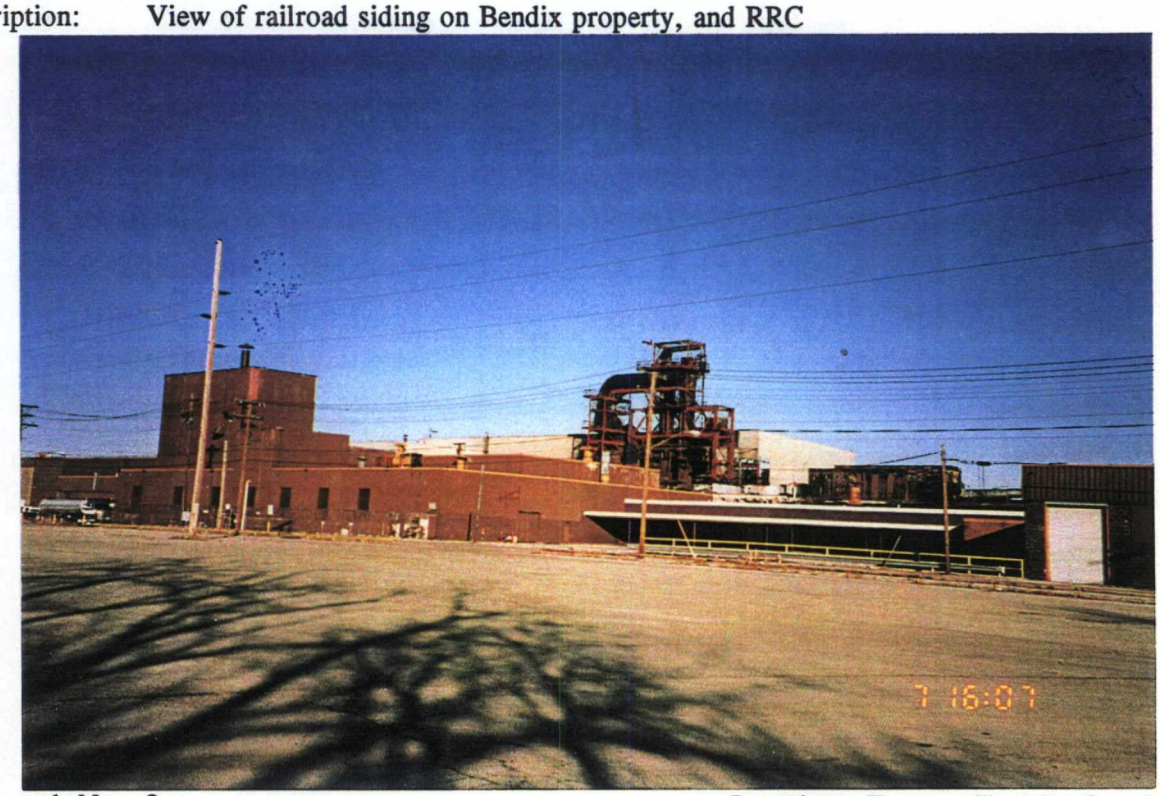
Photograph No. 4 Location: East side of site
Orientation: East Date: 12/7/95
Description: View of the current hazardous waste drum storage building

Photograph No. 5 Location: East side of site
Orientation: Southeast Date: 12/7/95
Description: View of fenceline, electrical substation, and former Chrysler foundry

Photograph No. 6 Location: Southwest side of site
Orientation: Southwest Date: 12/7/95
Description: View of RRC building, railroad tracks, Bendix fence, and the transfer station tanks for the former Pearl Oil



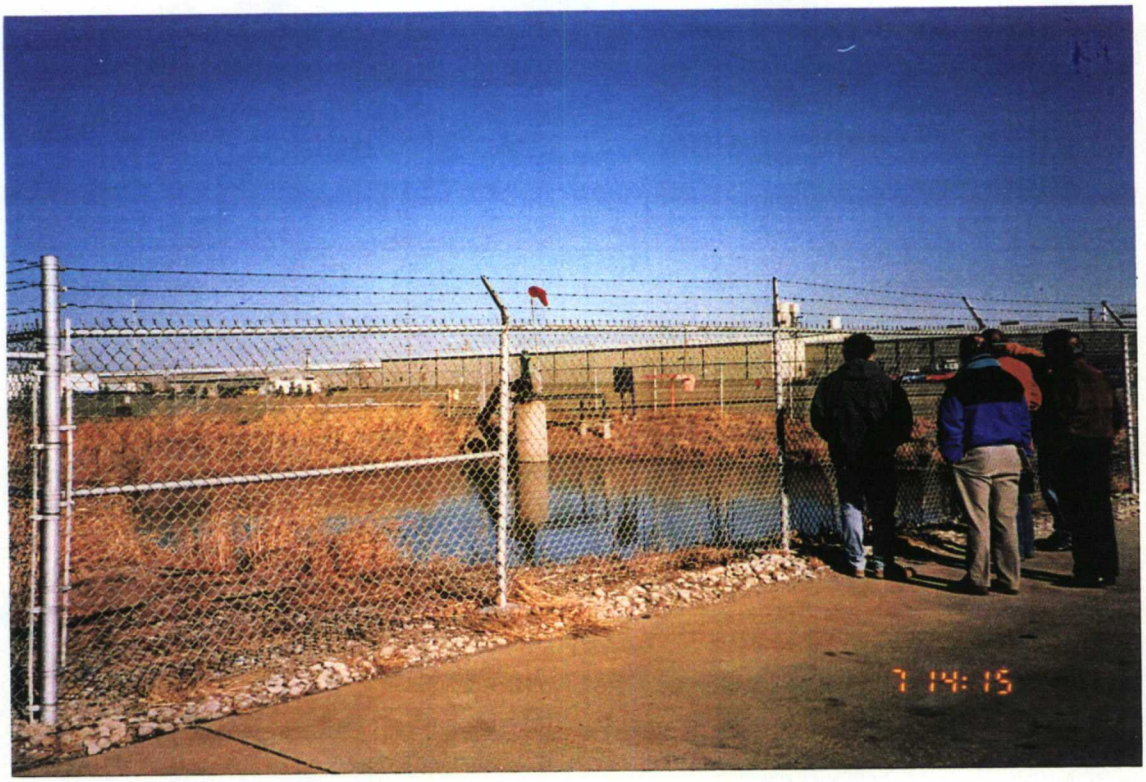
Photograph No. 7 Location: West-central side of site
Orientation: Southeast Date: 12/7/95
Description: View of railroad siding on Bendix property, and RRC



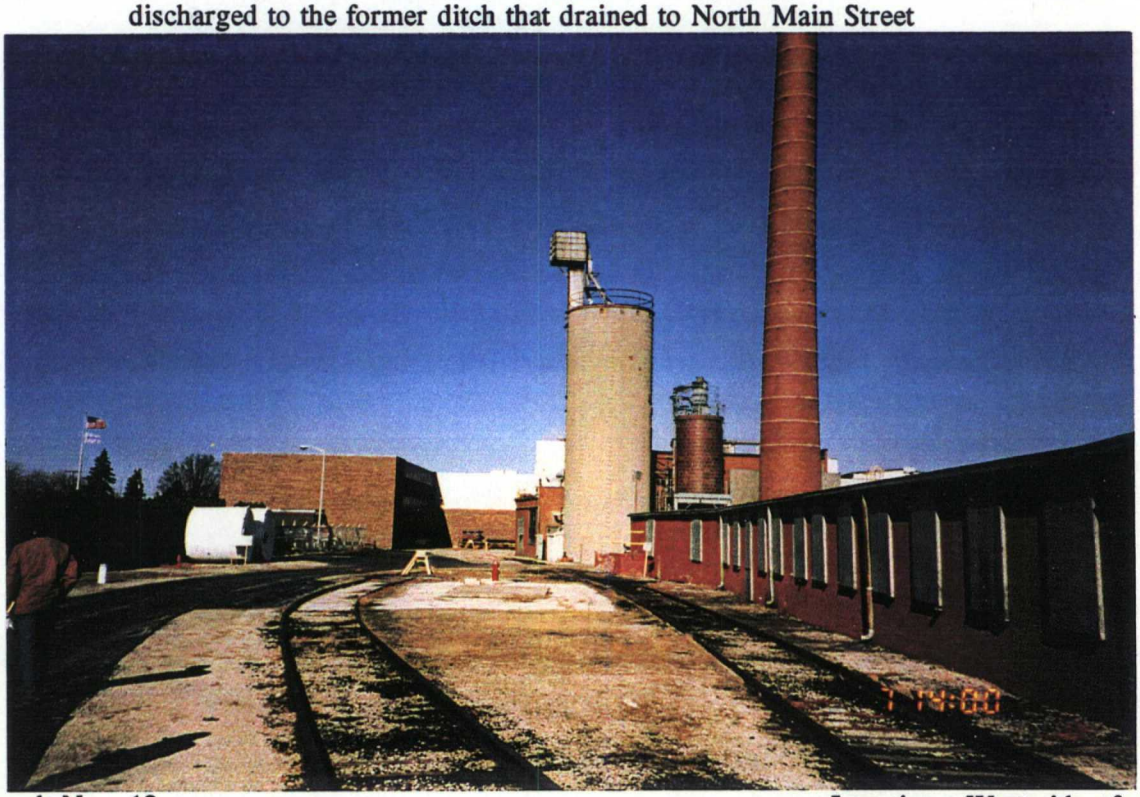
Photograph No. 8 Location: Former Chrysler foundry
Orientation: Northeast Date: 12/7/95
Description: View of former Chrysler foundry

Photograph No. 9 Location: Northeast corner of Jones and North Main Street
Orientation: Northwest Date: 12/7/95
Description: View of industry located north to northeast of the Bendix site

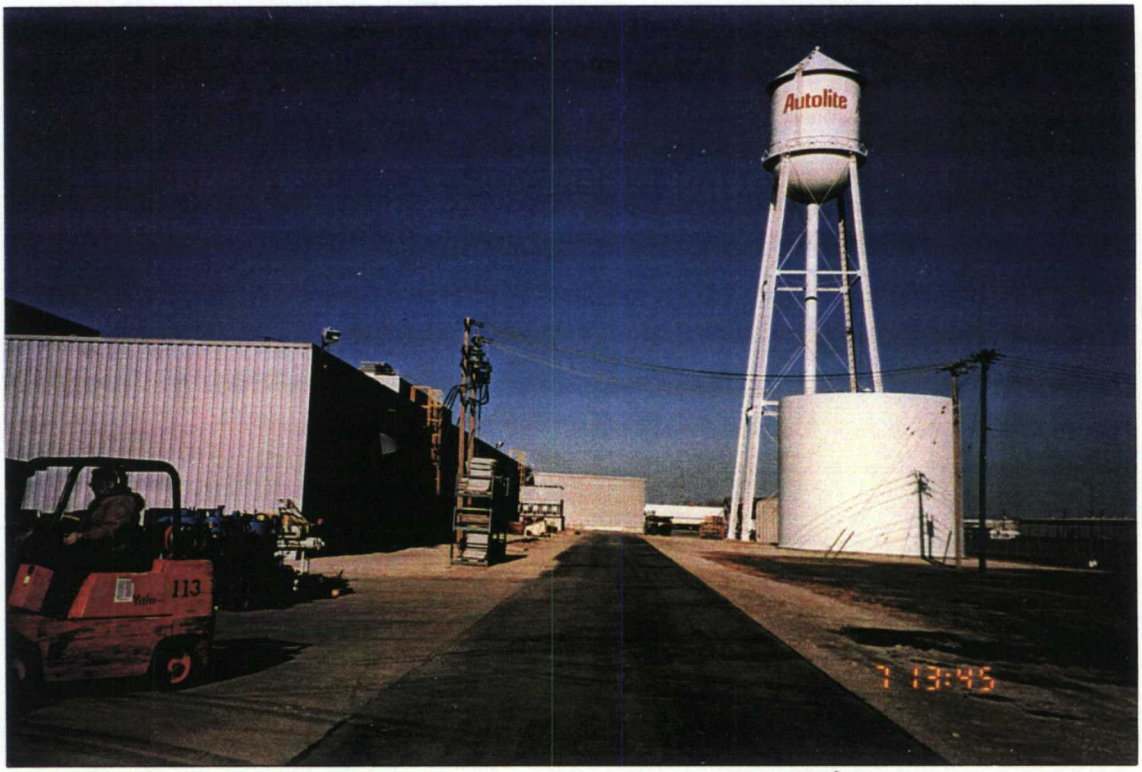
Photograph No. 10 Location: Quarry Pond
Orientation: Southeast Date: 12/7/95
Description: View of pumphouse and quarry pond



Photograph No. 11 Location: Stormwater Retention Pond
Orientation: Northeast Date: 12/7/95
Description: Storm water retention pond; drain pipe is located where surface water from pond discharged to the former ditch that drained to North Main Street



Photograph No. 12 Location: West side of site
Orientation: North Date: 12/7/95
Description: View of former power house, railroad siding, and administration building



Photograph No. 13 Location: East side of facility
Orientation: North Date: 12/7/95
Description: View of area where TCE was formerly stored